REMARKS

Independent claims 1 and 14 have been amended to recite that the magenta colorant is a magenta pigment composed of the combination of C.I. Pigment Red 31 and C.I. Pigment Red 150 within the range from 40:60 to 70:30 in terms of a mass ratio. Support can be found in the present specification at page 9, lines 6 to 9, and in original claim 2, now cancelled.

Further, claims 1 and 14 have been amended to recite that the magenta-colored resin particles have a volume average particle diameter dv within the range from 3.0 to 12.0 μm. Support for this amendment may be found in the passage from lines 17 to 20 on page 15 of the specification. Claim 8 has been amended accordingly to delete the phrase "a volume average particle diameter dv within the range from 3.0 to 12.0 μm".

I. The Rejection Based on Tosaka et al in view of Kuribayashi et al and Nakamura et al

Claims 1- 20 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Tosaka et al [U.S. Patent 6,667,140] in view of Kuribayashi et al [U.S. Patent Application Publication 2004/0009294] and Nakamura et al [U.S. Patent Application Publication 2003/0195274].

Applicants respectfully submit that the present invention is not rendered obvious over the disclosures of Tosaka et al in view of Kuribayashi et al and Nakamura et al and request that the Examiner reconsider and withdraw this rejection in view of the following remarks.

Office Action:

In the Office Action, the Examiner states:

> Tosaka et al teaches the magenta toner with specific monoazo pigments. The pigments are Pigment Red 31 and Pigment Red 150 note Col. 9, lines 15-30, 55 and Col. 10, line 30. The colorants are selected from the standpoints of hue angle, chroma, brightness, weather resistance, OHP permeability and dispersability in toners. Tosaka et al teaches the use of one or more pigments in combination note Col. 9 line 17. The toners can be produced by polymerization Col. 15 in an aqueous dispersion with Wax Col. 16 line 55-Col. 17 line 65. Additives such as charge control agents Col. 18 line 50 and inorganic fine particles Col. 19 are added to control the chargeability of the toner. The combination of monoazo pigments is also taught in Kuribayashi et al note [0032] that states "These pigments may be used either singly or in any combination thereof". Nakamura et al teaches a color toner and specific monoazo pigment composition note [0128]. These pigments can be used either individually or as a combination of two or more thereof in microencapsulated pigment of the invention.

The Examiner concludes that it would be obvious to one of ordinary skill in the at the time of Applicants' invention with a reasonable expectation of success to use the combination of

monoazo pigments well known to the skilled worker in the toner composition with additives to control the dispersability, chargeability and hue of a toner particles.

However, as set forth in detail below, Applicants respectfully submit that the magenta toner and production process thereof defined by claims 1 and 3 to 20 are neither anticipated by nor rendered obvious over the teachings of each references taken individually or in combination.

Present invention:

As recited in claim 1, the present invention relates to a magenta toner having magenta-colored resin particles comprising at least a binder resin and a magenta colorant. The magenta colorant is a magenta pigment composed of the combination of C.I. Pigment Red 31 and C.I. Pigment Red 150 within the range from 40:60 to 70:30 in terms of a mass ratio. The magenta-colored resin particles have a volume average particle diameter dv within the range from 3.0 to 12.0 μm.

As recited in claim 14, the process for producing a magenta toner having magenta-colored resin particles according to the present invention comprises:

Step 1 of preparing a polymerizable monomer composition containing at least a polymerizable monomer and a magenta colorant; and

Step 2 of polymerizing the polymerizable monomer composition in an aqueous dispersion medium to form the magenta-colored resin particles.

The magenta pigment comprises a combination of C.I. Pigment Red 31 and C.I. Pigment Red 150 within the range from 40:60 to 70:30 in terms of a mass ratio. By the process, magenta-

colored resin particles having a volume average particle diameter dv within the range from 3.0 to 12.0 μm are obtained.

The present invention relates to a magenta toner for developing an electrostatic latent image formed on a photosensitive member by an electrophotographic process or electrostatic recording process.

The magenta toner according to the present invention is used as a dry toner for development of electrostatic images. The magenta toner is generally used for forming full-color image by an electrostatic photographic system in combination with other color toners such as a yellow toner, a cyan toner and a black toner.

Among various color toners, conventional magenta toners have the following various problems.

First, magenta toners containing magenta colorant such as C. I. Pigment Red 122 have problems in that magenta toner particles are easy to be broken by contact between the magenta toner particles or stress between a feed roll and a development roll, or between a development and a photosensitive member in an image forming apparatus. When the magenta toner particles are broken, the flowability and printing density of the magenta toner are lowered.

Second, magenta pigments such as C.I. Pigment Red 57:1 are poor in light resistance, and so the resulting image may be faded with time in some cases.

Third, since magenta pigments such as C.I. Pigment Red 5 and C.I. Pigment Red 209 are chlorine atom-containing compounds, there is a possibility that dioxin may be generated when paper, on which images have been formed, is incinerated.

Fourth, magenta toners containing magenta colorant such as C.I. Pigment Red 122, C.I. Pigment Violet 19 and C.I. Pigment Red 150 are low in printing density and may cause fog in some cases.

Fifth, magenta toners containing magenta colorant such as C.I. Pigment Red 31 have problems in that not only the density of an image printed becomes low, but also hot offset occurs, and moreover storage stability becomes poor.

Sixth, magenta toners containing magenta colorant such as C.I. Pigment Red 150 have problems in that not only can form only images having a hue far from a hue by printing with inks and are poor in color reproducibility, but also they are low in printing density and poor in low-temperature fixing ability and causes fog under high-temperature and high-humidity conditions.

Accordingly, improvements in the conventional magenta toners are required. Specifically, the magenta toners are required to have such various properties that

i) They are prevented from breaking in an image forming apparatus to low flowability,

ii) A high image density is achieved,

iii) No fog is caused even under severe environments of low temperature and low humidity, and high temperature and high humidity,

iv) There is little possibility of causing an environmental problem such as generation of dioxin even when a transfer medium, on which an image has been formed with the toner, is incinerated,

v) An image obtained by printing is prevented from fading, and

vi) A hue equivalent to printing with inks can be reproduced.

Further, since a magenta toner is used in combination with other color toners, the magenta toner is required to be low in fixing temperature. If the fixing temperature of the magenta toner is too high, it is difficult to sufficiently fix a thick unfixed toner image formed with plural color toners to a transfer medium (for example, paper or an OHP sheet) when the magenta toner is overlapped with other color toners and transferred to the transfer medium. In addition, if the fixing temperature of the magenta toner is too high, such a toner cannot be adapted to high-speed printing.

However, the conventional magenta toners have been unable to satisfy these various properties.

In particular, the magenta toners are strongly desired to be high in printing density and have property capable of forming images having a hue equivalent to magenta in printing with inks.

In the present invention, whether a magenta toner can form an image having a hue equivalent to magenta in printing with inks or not is evaluated by the following evaluation method.

"i) Color tone:

After paper for printing was set in the above-described printer, a toner sample was charged into a developing device, and the printer was left to stand for a day under (N/N) environment of 23°C in temperature and 50% in humidity, solid printing was conducted. With respect to the paper, on which the solid printing had been conducted, the $L^*a^*b^*$ color space thereof was measured by means of a spectroscopic color-difference meter (manufactured by Nippon Denshoku K.K., model name "SE2000"). With respect to a hue difference from the magenta of Japan Color, a color tone of Japan Color Standard Paper measured likewise and a color tone obtained by printing with the toner sample are represented as coordinates of the $L^*C^*H^*$ color space to calculate out the hue difference ΔH in accordance with the following equation:

$$\Delta H^* = [(\Delta E^*)^2 - (\Delta L^*)^2 - (\Delta C^*)^2]^{1/2}$$

wherein ΔE^*: a color difference by the $L^*a^*b^*$ color space,

ΔL^*: a lightness index difference between 2 object colors in the $L^*a^*b^*$ color space,

and

ΔC^*: a difference between 2 object colors, ab chromas in the $L^*a^*b^*$ color space.

The amount of the toner attached to the surface of the paper in the solid printing was controlled so as to be about 0.45 mg/cm^2." (Page 39, line 11 to page 40, line 8)

As described above, whether the image having the hue equivalent to magenta in printing with inks can be formed or not is evaluated by the method of measuring the $L^*a^*b^*$ color space of

the paper, on which the solid printing has been conducted with the magenta ink, in the present invention. According to this evaluation method, the hue of the magenta toner can be exactly evaluated.

According to the present invention, the magenta toner excellent in the various properties can be obtained by selecting C.I. Pigment Red 31 and C.I. Pigment Red 150 from among a great number of magenta pigments and using these pigments in combination within the selected range of from 40:60 to 70:30 in terms of a mass ratio.

Applicant wishes to particularly point out the data from the comparison which are summarized in Table 1 of the present specification.

The magenta toner of Example 1 according to the present invention can form an image of a hue near to the magenta of the Japan Color standard paper printed by inks by using, as the magenta pigment, C.I. Pigment Red 31 and C.I. Pigment Red 150 in combination, and is high in printing density, hard to cause fog, excellent in low-temperature fixing ability and hard to cause hot offset even after conducting printing of 20,000 sheets as a durability test or even under any environment.

The magenta toner of Example 1 contains, as magenta pigments, C.I. Pigment Red 31 and C.I. Pigment Red 150 in combination at a mass ratio of 55:45, whereby all the values of L*, a*, and b* almost conform with Japan Color Magenta in the evaluation as to the hue of the paper printed, and an excellent hue can be exhibited as demonstrated by a hue difference (ΔH) as

extremely high as 3.24. Such data shows that the magenta toner according to the present invention can reproduce the hue equivalent to magenta in printing with inks.

In addition, the magenta toner of Example 1 prevents the occurrence of its breaking in an image forming apparatus and is also excellent in low-temperature fixing ability as demonstrated by its fixing temperature of 140°C.

On the other hand, as is apparent from the data in Table 1, that the magenta toner of Comparative Example 1 making use of the mixture of C.I. Pigment Red 122 and C.I. Pigment Red 150 as a magenta pigment, is greatly removed in hue from the magenta of the Japan Color standard paper printed by inks, is low in printing density, is liable to cause fog under the respective environments and is also poor in low-temperature fixing ability.

It is apparent that the magenta toner of Comparative Example 2 making use of C.I. Pigment Red 150 alone as a magenta pigment is greatly removed in hue from the magenta of the Japan Color standard paper printed by inks, is low in printing density, is liable to cause fog under both N/N environment and H/H environment and is also poor in low-temperature fixing ability.

It is apparent that the magenta toner of Comparative Example 3 making use of C.I. Pigment Red 31 alone as a magenta pigment is greatly removed in hue from the magenta of the Japan Color standard paper printed by inks, is low in printing density, is liable to cause fog under both N/N environment and H/H environment, is easy to cause hot offset and is also poor in storage stability of the toner.

Accordingly, in the present invention, excellent improvements that are unexpected to those skilled in the art are be achieved by adopting the selected combination of plural composing elements of the selected combination of C.I. Pigment Red 31 and C.I. Pigment Red 150 and the selected mass ratio of C.I. Pigment Red 31 to C.I. Pigment Red 150.

Tosaka et al (US 6,667,140 B2):

Tosaka et al disclose a magenta toner comprising at least a binder resin, a monoazo pigment composition and a wax composition.

As to the monoazo pigment, Tosaka et al describes:

> As the monoazo pigment, those having a structure represented by Formula (1) above are selected, and it is preferred to use one or more species in combination selected from C.I. Pigment Red 5, C.I. Pigment Red 31, C.I. Pigment Red 146, C.I. Pigment Red 147, C.I. Pigment Red 150, C.I. Pigment Red 176, C.I. Pigment Red 184 and C.I. Pigment Red 269 (according to Color Index, 4th Edition) in view of dispersibility in toner particles and the tint and chargeability of the resultant toner. (Column 9, lines 15 to 23)

Thus, Tosaka et al describe that various kinds of monoazo pigments may be used either singly or in any combination thereof.

However, Tosaka et al do not provide a reason or any suggestion of a combination of C.I. Pigment Red 31 and C.I. Pigment Red 150 from among such many monoazo pigments as

described above. Further, Tosaka et al do not suggest the combination of C.I. Pigment Red 31 and C.I. Pigment Red 150 within the range of from 40:60 to 70:30 in terms of a mass ratio.

Furthermore, Tosaka et al describe that

> Among the above, C.I. Pigment Red 5, C.I. Pigment Red 31, C.I. Pigment Red 150, C.I. Pigment Red 176, and C.I. Pigment Red 269 are further preferred, and C.I. Pigment Red 150 and C.I. Pigment Red 269 are particularly preferred. (Column 9, lines 24 to 27).

In other words, Tosaka et al describe that it is preferred embodiment to use the above-described monoazo pigments singly.

More specifically, Tosaka et al only show, in Examples thereof, toner preparation examples making single use of C.I. Pigment Red 269, single use of C.I. Pigment Red 150, single use of C.I. Pigment Red 176, single use of C.I. Pigment Red 31, and single use of C.I. Pigment Red 5 as the monoazo pigment (TABLE 1-2 on column 49-50). Tosaka et al do not specifically show the combined use of plural monoazo pigments.

Among the toner preparation examples disclosed in Tosaka et al, the magenta toner making single use of C.I. Pigment Red 150 corresponds to the toner of Comparative Example 2 of the present specification. As apparent from the data in Table 1 of the present specification, it is known that the magenta toner of Comparative Example 2 making use of C.I. Pigment Red 150 alone as a magenta pigment is greatly removed in hue from the magenta of the Japan Color

standard paper printed by inks, is low in printing density, is liable to cause fog under both N/N environment and H/H environment and is also poor in low-temperature fixing ability.

Among the toner preparation examples disclosed in Tosaka et al, the magenta toner making use of C.I. Pigment Red 31 corresponds to the toner of Comparative Example 3 of the present specification. As apparent from the data in Table 1 of the present specification, it is known that the magenta toner of Comparative Example 3 making use of C.I. Pigment Red 31 alone as a magenta pigment is greatly removed in hue from the magenta of the Japan Color standard paper printed by inks, is low in printing density, is liable to cause fog under both N/N environment and H/H environment, is easy to cause hot offset and is also poor in storage stability of the toner.

On the other hand, Tosaka et al also disclose the combinations of plural pigments. However, Tosaka et al describe that the combination of the monoazo pigment and a quinacridone pigment such as C.I. Pigment Red 122 is a more preferred embodiment to the combination of plural monoazo pigments.

More particularly, Tosaka et al describe that it is their preferred embodiment to use the above-mentioned monoazo pigment composition in combination with a quinacridone pigment composition (column 13, line 64 to column 14, line 23). Tosaka et al describe that as the quinacridone pigment composition, it is preferred to use C.I. Pigment Red 122, C.I. Pigment Red 202 or C.I. Pigment Violet (column 14, lines 42 to 44).

With respect to the combination of the monoazo pigment and the quinacridone pigment, Tosaka et al specifically disclose the combination of a quinacridone pigment composition containing C.I. Pigment Red 122 and a monoazo pigment containing C.I. Pigment 150 (column 59, lines 19-31). Table 3 (columns 61 and 62) of Tosaka et al shows toners respectively containing pigment compositions with the quinacridone pigment composition containing C.I. Pigment Red 122 and the monoazo pigment containing C.I. Pigment 150 mixed at various ratios.

The magenta toner containing the combination of C.I. Pigment Red 122 (quinacridone pigment) and C.I. Pigment Red 150 (monoazo pigment) is shown as Comparative Example 1 in Table 1 of the present specification.

As apparent from the data in Table 1 of the present specification, the magenta toner of Comparative Example 1 making use of the mixture of C.I. Pigment Red 122 and C.I. Pigment Red 150 as a magenta pigment is greatly removed in hue from the magenta of the Japan Color standard paper printed by inks, is low in printing density, is liable to cause fog under the respective environments and is also poor in low-temperature fixing ability.

After all, Tosaka et al neither teach nor suggest the combination of C.I. Pigment Red 31 and C.I. Pigment Red 150 within the extremely limited narrow range of from 40:60 to 70:30 in terms of a mass ratio along the lines of the present invention. The toners specifically disclosed in Tosaka et al correspond to the toners of Comparative Examples 1 to 3 of the present specification. Quite naturally, Tosaka et al neither teach nor suggest such marked improvements as described above, which are brought about by the present invention.

Kuribayashi et al (US 2004/0009294):

Kuribayashi et al do not remedy the deficiencies of Tosaka et al. Kuribayashi et al disclose an aqueous dispersion comprising a particle containing a water-insoluble colorant (claim 1). The particle is dispersed in a medium containing water. The dispersion has the light-scattering intensity of not more than 30,000 cps when the dispersion comprises an enough amount of the particle so as to show the absorbance peak value regarding the visible light as 1.

The particle disclosed in Kuribayashi et al is that obtained by dispersing a water-insoluble colorant 1 in a dispersing agent 2 as illustrated in the drawing. The aqueous dispersion is formed by dispersing the particle containing the water-insoluble colorant and the dispersing agent in an aqueous medium (claim 7).

An ink containing the particle in a state dispersed in the aqueous medium is used as an ink-jet ink (claims 5 and 6). Since a system that an ink is ejected from a nozzle having a fine diameter is adopted in ink jet printing, the average particle diameter of the particle is as fine as 150 nm (0.15 μm) or smaller (claim 2).

Accordingly, the particle disclosed in Kuribayashi et al is not a particle having a volume average particle diameter of 3 to 12 μm, which can be used as a toner (dry toner) of development of electrostatic images.

Kuribayashi et al describe:

> The pigment-containing particles or the aqueous dispersions thereof according to the present invention may be used as a wide variety of aqueous colorants for

printing inks, toners, paint, writing inks, coating materials for films, ferroelectric printers, liquid developers, electrophotographic materials, plastics, rubbers, fibers, etc. in addition to the inks for ink-jet recording. (Column [0109])

However, Kuribayashi et al neither specifically disclose nor suggest the magenta toner according to the present invention and the production process thereof.

Kuribayashi et al exemplify a great number of pigments as organic pigments soluble in the non-protic organic solvent in the presence of an alkali Column [0032]). Kuribayashi et al describe that these pigments may be used either singly or in any combination thereof.

However, Kuribayashi et al does not provide any reason or suggestion about using the combination of C.I. Pigment Red 31 and C.I. Pigment Red 150 is selected from among a great number of organic pigments, and both pigments are used in combination within the limited narrow range of from 40:60 to 70:30 in terms of a mass ratio.

Example 1 of Kuribayashi et al shows that an aqueous dispersion was obtained by using a quinacridone pigment of C.I. Pigment Red 122. Other Examples of Kuribayashi et al do not show an experiment example making use of C.I. Pigment Red 31 or C.I. Pigment Red 150 or a combination of both pigments as an organic pigment.

Accordingly, even the teachings of Tosaka et al and the teachings of Kuribayashi et al were to be combined, it would not have been obvious to one skilled in the art to arrive at the magenta toner according to the present invention. There is also no description, in these cited references, suggesting that unexpected improvements can be achieved by using C.I. Pigment Red

31 and C.I. Pigment Red 150 in combination within the range of from 40:60 to 70:30 in terms of a mass ratio along the lines of the present invention.

In addition, the effective date of Kuribayashi et al as a reference is May 20, 2003. The present application claims priority under 35 U.S.C. 119 of Japanese application number JP 2002-260850 filed September 6, 2002. Submitted herewith is certified copies and a verified English language translation of the prior Japanese application. A review of the English language translation of the Japanese application demonstrates that that the prior Japanese application fully discloses the presently claimed invention, whereby the effective date of the present application under 35 U.S.C. 119 is September 6, 2002.

Therefore, Kuribayashi et al not available as prior art with respect to the present application

Nakamura et al (US 2003/0195274):

Nakamura et al disclose a microencapsulated pigment comprising pigment particles having a hydrophilic group on the surface thereof and being coated with a polymer emulsion polymerization (claim 1).

The microcapsulated pigment of Nakamura et al is used as a pigment for an ink jet recording ink (column [0010]).

Since a system that an ink is ejected from a nozzle having a fine diameter is adopted in the ink jet recording, the microcapsulated pigment is so extremely fine as to be capable of passing through the nozzle.

Accordingly, the microcapsulated pigment disclosed in Nakamura et al is not a particle having a volume average particle diameter of 3 to 12 μm, which can be used as a toner (dry toner) of development of electrostatic images.

Nakamura et al exemplify a great number of pigments as organic pigments for yellow, magenta and cyan inks (columns [0126] to [0131]).

Nakamura et al describe that these pigments can be used either individually or as a combination of two or more thereof in the microencapsulated pigment of the invention (column [0131]).

However, Nakamura et al neither teach nor suggest nor provide any reason to use the combination of C.I. Pigment Red 31 and C.I. Pigment Red 150 is among a great number of organic pigments, and both pigments are to use the combination within the limited narrow range of from 40:60 to 70:30 in terms of a mass ratio.

One Example of Nakamura et al show that a quinacridone pigment of C.I. Pigment Red 122 was used as a magenta pigment to obtain a microcapsulated pigment MCP1-11 (columns [0373] to [0375]). Other Examples of Nakamura et al do not show a microcapsulated pigment making use of C.I. Pigment Red 31 or C.I. Pigment Red 150 or a combination of both pigments as an organic pigment.

Accordingly, even is teachings of Tosaka et al and the teachings of Nakamura et al were to be combined, it would not have been obvious to one skilled in the art to arrive at the magenta toner according to the present invention. There is no description, in these cited references,

suggesting that unexpected improvements can be achieved by using C.I. Pigment Red 31 and C.I. Pigment Red 150 are used in combination within the range of from 40:60 to 70:30 in terms of a mass ratio along the lines of the present invention.

The cited references, alone or in combination, do not provide any reason and neither teach nor suggest the fact that such unexpected marked improvements as described above, which are brought about by the present invention, can be achieved.

For the above reasons, it is respectfully submitted that the subject matter of claims 1 and 3-20 is neither taught by nor made obvious from the disclosures of Tosaka et al in view of Kuribayashi et al and Nakamura et al and it is requested that the rejection under 35 U.S.C. §103(a) be reconsidered and withdrawn.

II. Conclusion

In view of the above, Applicants respectfully submit that their claimed invention is allowable and ask that the rejection under 35 U.S.C. §103 be reconsidered and withdrawn. Applicants respectfully submit that this case is in condition for allowance and allowance is respectfully solicited.

If any points remain at issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the local exchange number listed below.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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